

**FCC - TEST REPORT**

Report Number : **709502404394-00B** Date of Issue: September 04, 2024

Model : CM-48

Product Type : Transmitter

Applicant : Coulisse B.V.

Address : Vonderweg 48, 7468 DC Enter, THE NETHERLANDS

Production Facility : Ningbo Dooya Mechanic & Electronic Technology Co., Ltd.

Address : No.168 Shengguang Road,Luotuo,Zhenhai 315202 Ningbo,Zhejiang province,
: PEOPLE'S REPUBLIC OF CHINA

Test Result : ☒ **Positive** ☐ **Negative**

Total pages including
Appendices : 20

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2 Details about the Test Laboratory & Report Modification Record

Details about the Test Laboratory

Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch
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FCC Registration No.: 820234

FCC Designation Number: CN1183

Report Modification Record:

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Report No.	Description of Change	Date of Issue
709502404394-00B	First Issue	09/04/2024



3 Description of the Equipment Under Test

Product:	Transmitter
Model no./HVIN:	CM-48
FCC ID:	ZY4CM48
Rating:	DC 3V
RF Transmission Frequency:	433.92 MHz
No. of Operated Channel:	1
Modulation:	FSK
Antenna Type:	PCB Antenna
Description of the EUT:	The Equipment Under Test (EUT) is a Transmitter with SRD function. We tested it and listed the worst data in this report.
Test sample no.:	SHA-817980-1

The sample's mentioned in this report is/are submitted/ supplied/ manufactured by client. The laboratory therefore assumes no responsibility for accuracy of information on the brand name, model number, origin of manufacture, consignment, antenna gain or any information supplied.



4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2023 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to ANSI C63.10-2013.

5 Summary of Test Results

Technical Requirements				
FCC Part 15 Subpart C				
Test Condition		Pages	Test Site	Test Result
§15.207	Conducted emission AC power port	9	Shield room	Not Applicable
§15.205, §15.209, 15.35 (c)§15.231(b),	Radiated Emission, 30MHz to 4.5GHz	10-14	3m chamber	Pass
§15.231(c)	Bandwidth Measurement	15-16	Shield room	Pass
§15.231(a)(1)	Deactivation Time	17	Shield room	Pass
§15.203	Antenna requirement	--	See Note 2	Pass

Note 1: N/A=Not Applicable. Conducted emission is not apply for battery operated device.

Note 2: The EUT uses a PCB Antenna. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.



6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: ZY4CM48 complies with Section 15.207, 15.205, 15.209, 15.231 of the FCC Part 15, Subpart C Rules.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

□ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements.

□ - **Does not** fulfill the general approval requirements.

Sample Received Date: June 6, 2024

Testing Start Date: June 6, 2024

Testing End Date: September 4, 2024

-TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch

Reviewed by:

Prepared by:

Tested by:

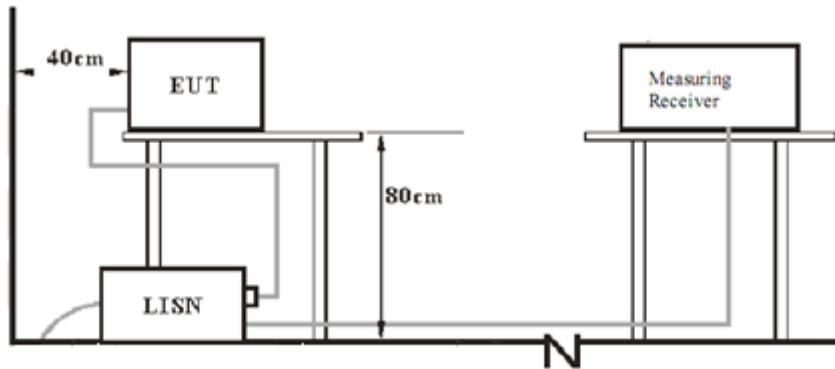
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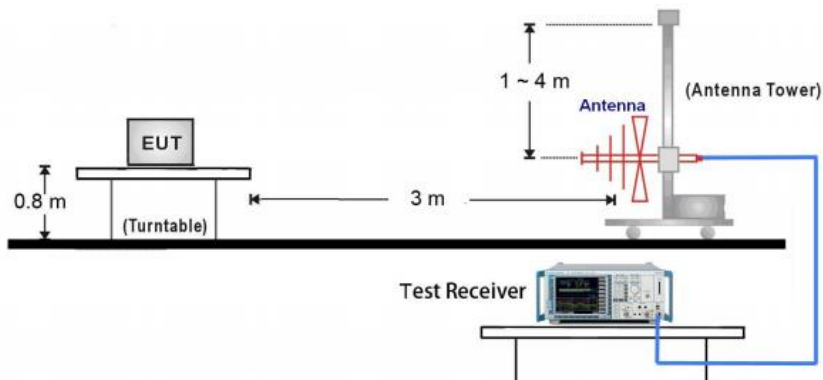
7 Test Setups

8.1 AC Power Line Conducted Emission test setups

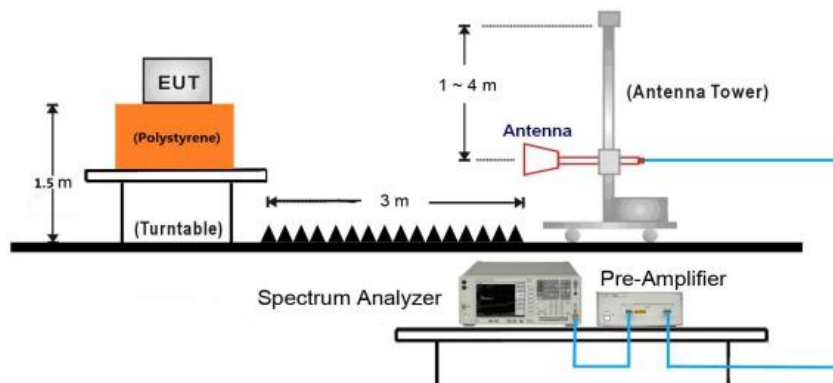


8.2 Radiated test setups

Below 1GHz



Above 1GHz



8 Test Methodology

8.1 Conducted Emission

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

Frequency MHz	QP Limit dB μ V	AV Limit dB μ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

Decreasing linearly with logarithm of the frequency

Note: Conducted emission is not apply for battery operated device.

8.2 Radiated Emission

Test Method

- 1: The EUT was placed on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
- 3: The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4: For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- 5: Use the following spectrum analyzer settings According to C63.10:

For Above 1GHz

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 1MHz, VBW \geq 3RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Below 1GHz

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 KHz, VBW \geq 3RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

Note:

- 1: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.
- 2: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for peak detection (PK) at frequency above 1GHz.
- 3: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (duty cycle \geq 98%) for peak detection at frequency above 1GHz
- 4: If the emission is pulsed (duty cycle $<$ 98%), modify the unit for continuous operation: use the settings shown above, then correct the reading by subtracting the peak to average duty cycle correction factor $20\log(\text{duty cycle})$, derived from the appropriate duty cycle calculation.

According to §15.231 (b), the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field Strength of Fundamental (Microvolts /meter @3m)	Field Strength of spurious emissions ((Microvolts /meter @3m)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	1,250 to 3,370 *	125 to 3750 *
174-260	3,750	375
260-470 √	3,750 to 12, 500*	375 to 1,250*
Above 470	12,500	1,250

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Limits for 15.209 Radiated emission limits; general requirements

Frequency	Limit at 3m (dBuV/m)
0.009 MHz – 0.490 MHz	128.5 to 93.8 ¹
0.490 MHz – 1.705 MHz	73.8 to 63 ¹
1.705 MHz – 30 MHz	69.5 ¹
30 MHz – 88 MHz	40.0 ¹
88 MHz – 216 MHz	43.5 ¹
216 MHz – 960 MHz	46.0 ¹
Above 960 MHz	54.0 ¹
Above 1000 MHz	54.0 ²
Above 1000 MHz	74.0 ³

¹Limit is with detector with bandwidths as defined in CISPR-16-1-1 except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz where an Average detector is used.

²Limit is with 1 MHz measurement bandwidth and using an Average detector.

³Limit is with 1 MHz measurement bandwidth and using a Peak detector.

Spurious radiated emissions for transmitter

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Antenna polarization	Frequency (MHz)	Duty Cycle Factor(dB)	Corrected Reading (dBuV/m)	Emission Type	Limit (dBuV/m)	Margin	Detector
H	433.908	0	55.88	Fundamental	100.80	44.92	PK
H	433.908	-16.77	39.11	Fundamental	80.80	41.69	AV
H	1301.765	0	33.47	Harmonics	74.00	40.53	PK
H	1301.765	-16.77	16.70	Harmonics	54.00	37.30	AV
H	2169.328	0	37.56	Harmonics	80.80	43.24	PK
H	2169.328	-16.77	20.79	Harmonics	60.80	40.01	AV
H	3471.218	0	42.17	Harmonics	80.80	38.63	PK
H	3471.218	-16.77	25.40	Harmonics	60.80	35.40	AV
H	3905.328	0	51.99	Harmonics	74.00	22.01	PK
H	3905.328	-16.77	35.22	Harmonics	54.00	18.78	AV
V	433.908	0	74.52	Fundamental	100.80	27.30	PK
V	433.908	-16.77	57.75	Fundamental	80.80	23.05	AV
V	1301.765	0	40.68	Harmonics	74.00	33.32	PK
V	1301.765	-16.77	23.91	Harmonics	54.00	30.09	AV
V	2169.328	0	38.50	Harmonics	80.80	42.30	PK
V	2169.328	-16.77	21.73	Harmonics	60.80	39.07	AV
V	3471.218	0	42.98	Harmonics	80.80	37.82	PK
V	3471.218	-16.77	26.21	Harmonics	60.80	34.59	AV
V	3905.546	0	58.40	Harmonics	74.00	22.40	PK
V	3905.546	-16.77	41.63	Harmonics	54.00	12.37	AV

Remark:

1: AV Emission Level= PK Emission Level+20log (duty cycle)

2: Other than listed in the table are attenuated more than 20dB below the permissible limit of the field strength, therefore no data appear in the report.

3: “*” means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.

4: Corrected Amplitude = Read level + Corrector factor

Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain

Below 1GHz: Corrector factor = Antenna Factor + Cable Loss

5. Correct Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz)

6. Corrected Reading = Original Receiver Reading + Correct Factor

Duty Cycle = 14.493ms/100 ms =14.493%.
Duty Cycle Factor =20log (Duty Cycle) =-16.77.





8.3 Bandwidth Measurement

Test Method

- 1. The RF output of EUT was connected to the test receiver by RF cable. The path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously.
- 3. Use the following test receiver settings:
Span = approximately 5 times the 20dB bandwidth, centered on a hopping channel
RBW =1% to 5% of the 20dB bandwidth of the emission being measured, VBW≥RBW,
Sweep = auto, Detector function = peak, Trace = max hold
- 4. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth. Record the results.
- 5. Repeat above procedures until all frequencies measured were complete.

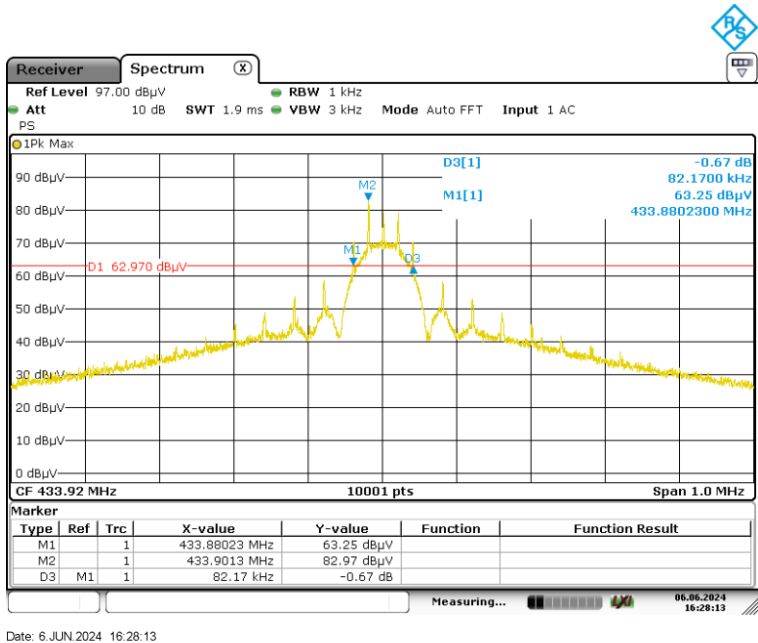
Limit

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. For devices operating above 900MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20dB down from the modulated carrier.

The limit for the EUT = 0.25% * 433.92 MHz = 1085 kHz

Test Result

Channel	20dB Bandwidth (KHz)	Limit (KHz)
1	82.17	1085



8.4 Deactivation Time

Test Method

1. The RF output of EUT was connected to the test receiver by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT in transmitting mode.
3. Set center frequency of spectrum analyzer=operating frequency.
4. Set the spectrum analyzer as RBW=120 KHz, VBW=1MHz, Span=0Hz.
5. Repeat above procedures until all frequency measured was complete.

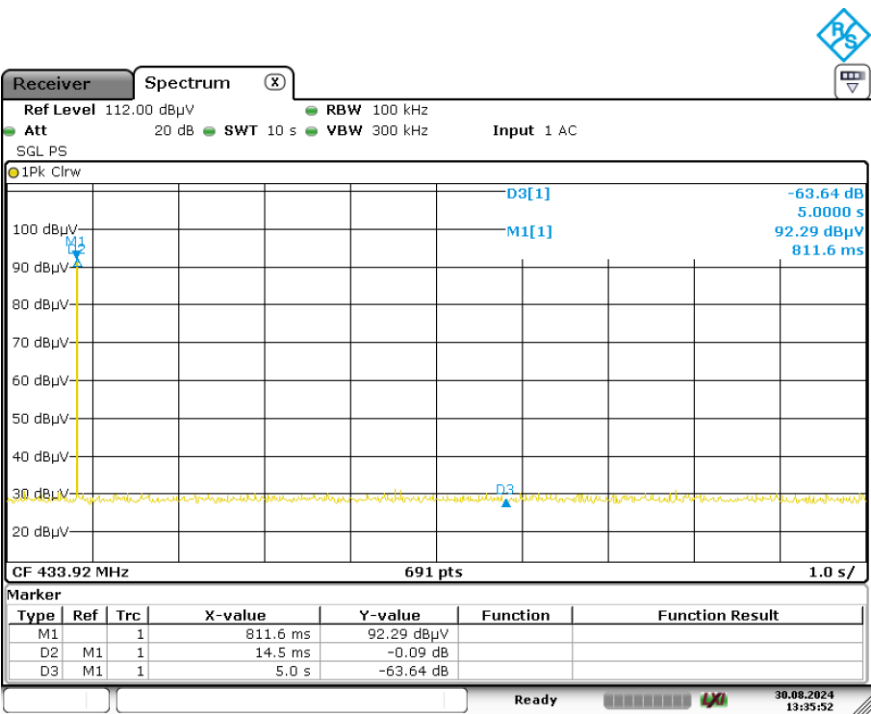
Limit

According to FCC Part 15.231 (a), the transmitter shall be complied the following requirements:

- (√) (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
- (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.
- (3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.

Test Result

Channel	Frequency	Deactivation Time	Result
1	433.92MHz	14.5ms	Pass



Date: 30.AUG.2024 13:35:52

9 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
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10 Test Equipment List

List of Test Instruments Test Site1

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DATE	CAL. DUE DATE
RE	EMI Test Receiver	Rohde & Schwarz	ESR3	S1503109-YQ-EMC	2024-8-1	2025-7-31
	Signal Analyzer	Rohde & Schwarz	FSV40	S1503003-YQ-EMC	2024-8-1	2025-7-31
	Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9168	S1808296-YQ-EMC	2021-9-23	2024-9-22
	Horn Antenna	Rohde & Schwarz	HF907	S1503009-YQ-EMC	2024-4-14	2027-4-13
	Pre-amplifier	Rohde & Schwarz	SCU-18D	S1503012-YQ-EMC	2024-8-1	2025-7-31
	Double Ridged Horn Antenna	ETS-Lindgren	3116C	S2208081-YQ-EMC	2023-7-7	2026-7-6
	3m Semi-anechoic chamber	TDK	3m	S1503231-YQ-EMC	2024-5-8	2027-5-7
CE	EMI Test Receiver	Rohde & Schwarz	ESR3	S1503001-YQ-EMC	2024-8-1	2025-7-31
	LISN	Rohde & Schwarz	ENV216	S1503103-YQ-EMC	2024-8-1	2025-7-31
Measurement Software Information						
Test Item	Software	Manufacturer	Version			
RE	EMC 32	Rohde & Schwarz	V10.50.40			
CE	EMC 32	Rohde & Schwarz	V9.15.03			



11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

Items	Extended Uncertainty
Radiated Disturbance	30MHz to 1GHz, 5.03dB (Horizontal)
	5.11dB (Vertical)
	1GHz to 18GHz, 5.15dB (Horizontal)
	5.12dB (Vertical)
	18GHz to 25GHz, 4.76dB

Measurement Uncertainty Decision Rule:

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2023, clause 4.3.3.



12 Photographs of Test Set-ups

Refer to the < Test Setup photos >.



13 Photographs of EUT

Refer to the < External Photos > & < Internal Photos >.

THE END